

THE MILDEW SPHAEROTHECA CASTAGNI ON BIDENS
AS A FUNGUS FOR CLASS USE

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In the course of my studies on the mildews I have found that *Bidens frondosa* lends itself admirably to the growing of *Sphaerotheca castagnei* on the leaves of potted plants in the greenhouse. Bidens is very common in fields, waste places and roadsides, and in the late summer and early fall the mildew spreads abundantly all over the plant; it is, in fact, difficult to find plants at this time that do not have some fungus on them and most plants are literally covered with it. Towards the end of September infected Bidens were brought into the greenhouse, potted and kept growing until plants grown from seed were ready for infection. The first sowing was made October 24, and when the seedlings were four weeks old they were placed among the infected field plants. It was soon found that the mildew spread naturally from plant to plant and a week after exposure a few ripe perithecia were visible on the leaves. A second sowing was made December 4, the plants producing perithecia after the holidays. No difficulty was found in transferring the mildew from one host plant to another; it spread naturally from field plants to greenhouse plants. That the spores are carried a considerable distance by light currents of air in the greenhouse is shown by the fact that uninfected plants placed over ten feet away from the infected plants showed abundant growth of mildew about as soon as the plants that were growing close by. To insure infection an infected plant should be placed in the midst of the new plants, but this precaution is perhaps unnecessary. Successive crops of *Sphaerotheca* have been grown in the greenhouse throughout the winter, the fungus spreading with undiminished vigor.

A point of interest is that the host plant during the period of shortened daylight comes to maturity very early. The plants grown from seed sown in December started to produce flowers after four weeks and in five weeks, though they were but seven inches tall, many plants had ripe seeds and then died off rapidly. This early maturing can be delayed somewhat as has been shown in the case of other lots of plants, by picking off the buds as soon as they appear.

Plants from seed sown in January were exposed to artificial illumination at night, and these all made decided increases in growth and seed production was delayed three weeks. A 50-watt electric light bulb placed 18 inches above the plants provides the illumination. During February and March the increase in growth was doubtless due to the longer period of daylight at this time, as well as to the artificial illumination. Although they were kept in six-inch pots the plants that were sown in March were 6 to 7 feet high in June and were still making rapid growth until in July many were over 7 feet high and all then came to maturity and died off. The mildew on these tall plants did not make as good growth on the upper leaves as on the lower ones; only a few scattered round patches of mildew appeared on the former, although the lower leaves showed an abundance of mildew. *Bidens frondosa* is a good vigorous greenhouse plant and thrives throughout the year under greenhouse conditions.

Sphaerotheca is a typical ascomycete, and because all sexual and asexual stages may be found in a small area, and because of its availability, it is excellent material for class use. The ascocarp of *Sphaerotheca castagnei* develops on both sides of the leaves of *Bidens* and usually spreads in circular patches which become irregularly distributed over the leaves and other parts of the plant. The mildew first appears on the leaves as small white specks. With a lens these specks will prove to consist largely of conidia with a few closely appressed antheridia and oogonia and possibly some very young white, spherical ascocarps. Pairs of oogonia and antheridia appear almost simultaneously with the conidia. Older spots will show ascocarps which may be slightly yellowed; eventually these ascocarps turn very dark brown and appear under the lens as glistening black spheres. The spots themselves are more or less circular in outline with an abundance of conidia around the margins and irregularly distributed conidia and ascocarps of all ages throughout the rest of the area. The mildew spreads in all directions forming gradually enlarging circular patches which after one week show ripe, blackish perithecia in the center and numerous perithecia of varying ages over the rest of the spots. The central part of the mildewed area soon turns a very dark brown because of the many dark brown perithecia. Conidia

continue to develop along with the production of perithecia, though in older spots the production of conidia diminishes until finally a diseased area shows little but ripe perithecia, very few conidia and very little of the mycelium remaining.

The growth of the mildew on greenhouse plants started in all the cases observed on the upper surface of the leaves, the mycelia appearing later on under the surface. None of the younger spots on the under surface of the leaves were independent of the mildew on the upper surface; it was always possible in the spots examined to trace the mycelium connecting the areas of mildew on both upper and lower leaf surfaces. Between November and May the mildew grew most abundantly on the upper surfaces of the leaves and in many cases during December, January and February there was no growth of mildew on the under surfaces of the leaves. In May and June there was abundant growth on both sides of the leaves, but after this period the mildew grew most abundantly on the under leaf surfaces producing no ascocarps on the upper parts.

For classes in mycology *Sphaerotheca* should prove to be a very desirable type, since one may plan to have it in vigorous growing condition for study at any specified time of the year. From the time of sowing the seed of the host plant to the time when ripe perithecia may be produced varies from five to eight weeks according to conditions.

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BOOK REVIEW

SCHAFFNER'S FIELD MANUAL OF TREES*

Another book to add to the many reflecting the present interest in nature study and helping increase such interest, this little manual is both convenient and very usable. There are keys to the trees in the summer condition based chiefly on leaves; in the winter condition based on twigs and buds; to the fruits and a general key based on both leaf and flower characters. The last key seems unnecessary. The keys are simple and easily followed through to the genera. Under these are keys to the

* John H. Schaffner, *Field Manual of Trees*, 3rd Edition, 154 pp., R. G. Adams and Co. Columbus, Ohio, 1926. \$1.50.